

LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Oct. 17-21, 2011.



JUST ABOUT THREE



LLNL's Reg Beer, right, and Gary Johnson test a new PCR instrument.

Imagine waiting for lab results for just three minutes.

It's not your imagination playing tricks on you because the Lab's Reg Beer and his team are developing a sub-three-minute DNA testing technology that could, in fact, help you get test results from a mere swab in minutes instead of hours.

"This instrument performs a very rapid DNA test, and within 10 minutes the patient and the doctor would both be able to review the results of that test," Beer said.

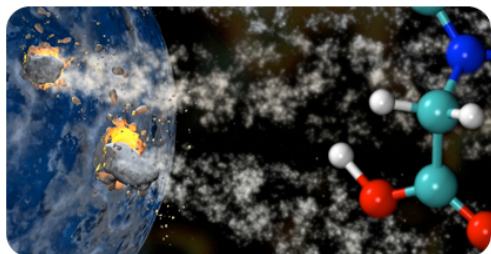
No more 24- to 48-hour wait.

"So that drove us to develop a very fast DNA amplification engine, that would allow a doctor to take a swab during an initial meeting with the patient, run the test in front of the patient, and then have the results to show the patient within about 10 minutes," Beer said.

To hear an interview with Beer, go to the [Osgood Files](#).



OUT OF THIS WORLD



Protein-building amino acids could have been "shock synthesized" in comets impacting early Earth. Image by Liam Krauss/LLNL

Life on Earth as we know it could be from out of this world. Research from Laboratory scientists shows that comets that crashed into Earth millions of years ago could have produced amino acids -- the building blocks of life.

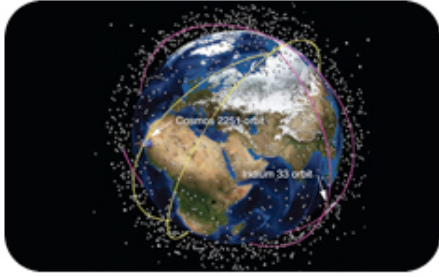
LLNL's Nir Goldman and colleagues discovered that simple molecules found within comets (such as water, ammonia, methylene and carbon dioxide) might have been instigators of life on Earth. His team discovered that the sudden compression and heating of cometary ices crashing into Earth can produce complexes resembling the amino acid, glycine.

"There's a possibility that the production or delivery of prebiotic molecules came from extraterrestrial sources," Goldman said. "On early Earth, we know that there was a heavy bombardment of comets and asteroids delivering up to several orders of magnitude greater mass of organics than what likely was already here."

To read more, go to [Daily Galaxy](#).



A LITTLE SHORT ON SPACE



A Livermore visualization shows the orbits of the two satellites prior to the collision among the hundreds of other orbiting satellites.

Each day, hundreds of active satellites as well as tens of thousands of pieces of "space junk" -- defunct satellites, bits of booster rockets and lost astronaut tools -- orbit Earth.

This space junk became front page news two years ago, when a defunct Russian satellite and a privately owned American communications satellite collided near the North Pole. The incident produced clouds of debris that quickly joined the orbital junk parade, increasing the possibility of future accidents.

Add to that the 80 countries that have joined the space community, and it would appear that space -- at least what's located immediately outside of Earth -- is getting a little short on space.

Lawrence Livermore, in collaboration with Los Alamos and Sandia national laboratories and the Air Force Research Laboratory, is working to improve the nation's capabilities for detecting and monitoring threats to U.S. space operations.

To read more or hear and interview, go to [Science Today](#).



THE BIGGEST IN THE WORLD



Dawn, a 500-teraFLOP (trillion floating operations per second) IBM BlueGene/P system, will help lay the foundation for the 20-petaFLOPS (quadrillion floating operations per second) Sequoia (IBM/BlueGene/Q) system.

While computing companies race to build the world's most powerful supercomputers, , IBM is busy building one of its own for the Laboratory in the form of Sequoia.

Sequoia, set for completion in 2012, will be used to help ensure the safety and reliability of the nation's aging nuclear deterrent.

Sequoia is expected to be the most powerful supercomputer in the world and will be approximately 10 times faster than today's most powerful system. To put this into perspective, if each of the 6.7 billion people on earth had a hand calculator and worked together on a calculation 24 hours per day, 365 days a year, it would take 320 years to do what Sequoia will do in one hour.

The Sequoia system will be focused on strengthening the foundations of predictive simulation through running very large suites of complex simulations.

To read more, go to [IT World](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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